

REMARKS

Applicants and Applicants' representative (Tu Nguyen) thank Examiner Tso for the courteous and productive telephonic interview on November 7, 2006.

The independent claims (1, 4, 21, and 24) have been amended to clarify the term "state of charge"; dependent claim 35 has been amended to correct a grammatical error; and new dependent claims 41 and 42 have been added. Support for the amendments can be found, for example, at page 8, lines 15-19, and page 21, lines 18-20. The amendments clarify the scope of the claims, as supported by the specification, and do not narrow the scope of the claims. Claims 1-42 are presented for examination.

Prior to this Amendment, claims 1-40 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,592,067 ("Peter"); and dependent claims 19, 20, 39 and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Peter.

As amended, the claims recite energy storage units, a selected storage unit having a state a charge, which is "a fraction of a fully charged capacity of the selected unit". The claims further recite a controller configured to determine the state of charge, or determining the state of charge.

As Applicants explained in the previous response, Peter does not disclose or suggest a controller configured to determine the state of charge, or determining the state of charge, as recited in the amended claims. At best, Peter equalizes cell terminal voltage. Indeed, in response to Applicants' previously-submitted remarks as to what Applicants mean by "state of charge", the Examiner did not indicate that Peter discloses or suggests determining state of charge. Rather, the Examiner appeared to have maintained the previous rejections based on an interpretation that Applicants' state of charge is equivalent to charge: "The end result is that the charges of the batteries are all balanced". (See Office Action at page 4.) This interpretation is no longer valid in light of the current amendments.

Furthermore, during the telephonic interview in which the current amendments were discussed, the Examiner apparently agreed that the cited patent does not disclose or suggest determining state of charge, as recited in the amended claims.

As Applicants explained in the specification, determining state of charge, as that term is used by Applicants, can enhance battery life and safety:

In prior art techniques, charge is measured and used as an indicator of cell equalization. However, charge, which is measured in Ampere-hour (Ah), is quite different from state of charge (SOC). It is not sufficient to only measure charge in order to equalize cells, because cells having the same charge may not have the same state of charge.

For example, assume two cells have a capacity of 20 Ah. When the cells are charged to 20 Ah, both have a 4.2V potential. Assuming that full cell capacity can be utilized, the cells can be equalized to a state of charge of 50% by equalizing the charge of the cells to 10 Ah, resulting in a certain voltage less than 4.2V.

However, assume further that the two cells degrade differently, such that the first cell can only achieve a maximum capacity of 18 Ah and the second cell can only achieve a maximum capacity of 15 Ah in their respective degraded state. When both cells are charged to their maximum capacities, both have a voltage potential of 4.2V. In this case, if the two cells are equalized to an equilibrium charge of 10 Ah, the first cell would be discharged by 8 Ah and the second cell would be discharged by 5 Ah. This results in the cells having different states of charge (i.e., 56% and 67% respectively), and thus two quite different cell voltages. Hence the cells are not considered equalized.

Therefore, the method of equalizing cell charge does not become reliable for the degraded cells or for cells that are not equivalent in nature. This inability to equalize state of charge leads to low battery life and safety hazards. The low life is caused by potential deep discharge or overcharging, resulting from the inability to determine state of charge. Further, and especially for lithium-ion batteries, the overcharge or over-discharge may cause thermal runaway due to possible formation of dendrites that can cause internal shortage of the cells.

(See page 9, lines 1-24 of the specification.)

In light of the above amendments and remarks, and without conceding that Peter discloses or suggests any other features of the presented claims, Applicants request that the rejections of claims 1-40 over Peter be withdrawn.

New dependent claims 41 and 42 are patentable over the cited reference for at least the same reasons that their base claims are patentable over the cited reference.

Conclusion

For at least the reasons discussed above, Applicants believe the claims are in condition for allowance, which action is requested. If allowance of this matter can be expedited, Applicants invite the Examiner to call the undersigned representative.

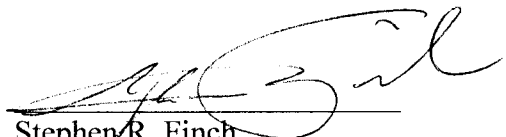
Please apply any other charges or credits to deposit account 50-3421 (referencing Attorney Docket No. TI01.701US).

Respectfully Submitted,

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By their Representatives,
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